CLAIMS

1.   A detection system of a segment including a specific sound signal detects a segment including sounds similar to a reference signal that is

5   a specific sound signal from stored signals, comprising:

a reference signal spectrogram division portion which divides a reference signal spectrogram that is a time-frequency spectrogram of the reference signal into spectrograms of small-regions that are small-region reference signal spectrograms;

10   a small-region reference signal spectrogram coding portion which encodes the small-region reference signal spectrogram to a reference signal small-region code;

a small-region stored signal spectrogram coding portion which encodes a small-region stored signal spectrogram that is a spectrogram of

15   a small-region in a stored signal spectrogram which is a time-frequency spectrogram of the stored signal to a stored signal small-region code;

a similar small-region spectrogram detection portion which detects a small-region spectrogram similar to the small-region reference signal spectrograms respectively based on a degree of similarity of a code from

20   the small-region stored signal spectrogram; and

a degree of segment similarity calculation portion which uses a degree of small-region similarity of a small-region stored signal spectrogram similar to the small-region reference signal spectrogram in detected stored signal spectrograms and calculates a degree of similarity

25   between the segment of the stored signal including the small-region stored signal spectrogram and the reference signal, wherein:

the detection system of a segment including a specific sound signal detects the segment including a sound in the stored signals similar to the reference signal based on the degree of segment similarity.

2.   The detection system of a segment including a specific sound signal according to claim 1, wherein:

the small-region reference spectrogram coding portion and the small-region stored signal spectrogram coding portion use power spectrum values of each point on the small-region spectrogram as a feature vector, and calculate the reference signal small-region code and the stored signal small-region code respectively by quantizing the feature vector.

3.   The detection system of a segment including a specific sound signal according to claim 1, wherein:

the small-region reference spectrogram coding portion and the small-region stored signal spectrogram coding portion respectively generate the reference signal small-region code and the stored signal small-region code by encoding a spectrum feature at each time point in the small-region spectrogram to a code, generating a histogram by counting up appearance of the code in the small-region spectrogram, generating a histogram feature that is a feature vector constructed from bin counts in the histogram, and encoding the histogram feature by vector quantization.

4.   The detection system of a segment including a specific sound signal according to one of claims 1, wherein:

the similar small-region spectrogram detection portion, with respect to the small-region reference signal spectrogram, compares sequentially based on the degree of small-region similarity to the small-region stored signal spectrograms of a list in which the small-region stored signal spectrograms corresponding to a frequency band of the small-region reference signal spectrogram are ordered in time-series, and detects only similar small-region stored signal spectrograms.

5. The detection system of a segment including a specific sound signal according to one of claims 1, further comprising;

a table of degree of similarity among small-region codes generation function which, with respect to the small-region codes calculated by encoding the small-region spectrogram, generates a table of degree of similarity among small-region codes by calculating degree of similarity among all small-region codes, wherein:

the similar small-region spectrogram detection portion detects similarity between the small-region reference signal spectrogram and the small-region stored signal spectrogram by referring to the table of degree of similarity among small-region codes.

6. The detection system of a segment including a specific sound signal according to one of claim 5, further comprising;

an index generation function which generates an index in which appearance time points in the stored signal are grouped by using the small-region codes, wherein:

the similar small-region spectrogram detection portion refers to the index using the small-region code similar to the reference signal small-region code selected by referring to the table of degree of similarity among small-region codes, and detects the small-region stored spectrogram having the small-region code as the small-region stored signal spectrogram similar to the small-region reference signal spectrogram.

7. A detection method of a segment including a specific sound signal which detects a segment including sounds similar to a reference signal that is a specific sound signal from stored signals, comprising the steps of:

a reference signal spectrogram division step which divides a

reference signal spectrogram that is a time-frequency spectrogram of the reference signal into spectrograms of small-regions that are small-region reference signal spectrograms;

a small-region reference signal spectrogram coding step in which the small-region reference signal spectrogram is encoded to a reference signal small-region code;

a small-region stored signal spectrogram coding step in which a small-region stored signal spectrogram that is a spectrogram of a small-region in a stored signal spectrogram which is a time-frequency spectrogram of the stored signal, is encoded to a stored signal small-region code;

a similar small-region spectrogram detection step in which a small-region spectrogram similar to the small-region reference signal spectrograms is detected respectively from the small-region stored signal spectrogram based on a degree of similarity of a code; and

a degree of segment similarity calculation step which uses a degree of small-region similarity of a small-region spectrogram similar to the small-region reference signal spectrogram in detected stored signal spectrograms and calculates a degree of similarity between the segment of the stored signal including the small-region stored signal spectrogram and the reference signal, wherein:

the detection method of a segment including a specific sound signal detects the segment including a sound in the stored signals similar to the reference signal based on the degree of segment similarity.

8.   The detection method of a segment including a specific sound signal according to claim 7, wherein:

in the small-region reference spectrogram coding step and the small-region stored signal spectrogram coding step, power spectrum values

of each point on the small-region spectrogram as a feature vector are used, and the reference signal small-region code and the stored signal small-region code are calculated respectively by quantizing the feature vector.

9.   The detection method of a segment including a specific sound signal according to claim 7, wherein:

in the small-region reference spectrogram coding step and the small-region stored signal spectrogram coding step, the reference signal small-region code and the stored signal small-region code are respectively generated by encoding a spectrum feature at each time point in the small-region spectrogram to a code, generating a histogram by counting up appearance of the code in the small-region spectrogram, generating a histogram feature that is a feature vector constructed from bin counts in the histogram, and encoding the histogram feature by vector quantization.

10.   The detection method of a segment including a specific sound signal according to one of claims 7, wherein:

the similar small-region spectrogram detection step, with respect to the small-region reference signal spectrogram, compares sequentially based on the degree of small-region similarity to the small-region stored signal spectrograms of a list in which the small-region stored signal spectrograms corresponding to a frequency band of the small-region reference signal spectrogram are ordered in time-series, and only similar small-region stored signal spectrograms are detected.

11.   The detection method of a segment including a specific sound signal according to one of claims 7, further comprising;

a step which, with respect to the small-region codes calculated by

encoding the small-region spectrogram, generates a table of degree of similarity among small-region codes by calculating degree of similarity among all small-region codes, wherein:

the similar small-region spectrogram detection step detects similarity between the small-region reference signal spectrogram and the small-region stored signal spectrogram by referring to the table of degree of similarity among small-region codes.

12.   The detection method of a segment including a specific sound signal according to claim 11, further comprising;

an index generation step which generates an index in which appearance time points in the stored signal are grouped by using the small-region codes, wherein:

the similar small-region spectrogram detection method refers to the index using the small-region code similar to the reference signal small-region code selected by referring to the table of degree of similarity among small-region codes, and detects the small-region stored spectrogram having the small-region code as the small-region stored signal spectrogram similar to the small-region reference signal spectrogram.

13.   A detection program of a segment including a specific sound signal operates a computer to work as the detection system of a segment including a specific sound signal according to one of claims 1.

14.   A computer readable medium storing the detection program of a segment including a specific sound signal according to claim 13.